

REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application. Claims 5, 6, 19, 27, 28, 32, 33, 35, 36, 38 and 40-43 are amended. Claims 31, 39 and 45 are canceled without prejudice. New claims 51-56 are added. Claims 1-30, 32-38, 40-44 and 46-56 are pending in this application.

The Office Action indicates (p. 2) that the drawings are objected to because the reference characters 110 and 114 of p. 9 of the specification do not appear in the drawings. The amendments to the specification bring the drawings and specification into mutual conformance. No new matter is added by the amendment to the specification. Accordingly, Applicant respectfully requests that the objection to the drawing be withdrawn.

The amendments to claims 6, 19 and 27 address minor informalities noted during review, however, these amendments are not intended to alter the scope of the claims. No new matter is added by these amendments.

Claims 31, 39 and 45 have been canceled without prejudice in order to reduce the number of issues for consideration, claims 32 and 41 have been amended to place them in independent form and claims 33, 35, 36, 38, 40, 42 and 43 have been amended to depend from claim 32 or 41.

35 U.S.C. § 112

Claims 5 and 28 stand rejected under 35 U.S.C. §112, second paragraph. Claims 5 and 28 have been amended to obviate the concerns noted in the Office Action, however, these amendments are not intended to alter the scope

of the claims. Accordingly, Applicant respectfully requests that the §112 rejections be withdrawn.

35 U.S.C. § 103

Claims 1-4, 9-45 and 50 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,893,095 to Jain et al. (hereinafter "Jain") in view of U.S. Patent No. 6,347,313 to Ma et al. (hereinafter "Ma"). Claims 5-8 and 46-49 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Jain and Ma as applied above and further in view of "Relevance Feedback: A Power Tool for Interactive Content-Based Image Retrieval" by Rui et al., IEEE Trans. on Circuits and Systems for Video Technology, Vol. 8, No. 5, Sept. 1998 (IEEE Cat. No. 1051-8215/98). Claims 31, 39 and 45 have been canceled without prejudice, rendering their rejection moot.

The Examiner admits (p. 4) that Jain fails to teach the use of relevance feedback or user feedback to generate new query vectors. The Examiner finds suggestion for such in the discussion of query refinement or systematic browsing. Applicant respectfully disagrees, at least because such does not suggest relevance feedback.

For example, neither query refinement nor systematic browsing corresponds to "no opinion", "irrelevant" or "highly irrelevant", as recited in new claims 51, 53 and 55. Either technique presumes and relies upon a degree of relevancy associated with either the query or whatever subject matter is being browsed.

Assuming *arguendo* that a user of Jain's system could manually generate a new query by the methods discussed in the Office Action still does not teach, disclose, suggest or motivate use of relevance or lack thereof in a recursive search scheme as recited in Applicant's claims. Suggestion to modify as put forth in the Office Action appears to employ an improper "obvious to try" rationale, as is discussed below in more detail with reference to MPEP §2145(X)(B). This MPEP section states that:

The admonition that 'obvious to try' is not the standard under §103 has been directed mainly at two kinds of error. In some cases, what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful.... In others, what was 'obvious to try' was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it. *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (citations omitted).

In fact, Jain employs terminology related to relevance exactly five times: (i) at col. 13, lines 64 and 65, noting that color is not relevant to analysis of X-ray images; (ii) with respect to technology relevant to image analysis (col. 15, lines 4 and 5); (iii) to describe a relationship between "primitives" and image properties (col. 15, lines 58 and 59); (iv) to indicate a set of candidate images (col. 17, lines 28 and 29); and to indicate technology relevant to image analysis (col. 22, lines 27 and 28). Jain clearly understands the term "relevant" and chooses not to teach, disclose, suggest or motivate use of relevance in refining search criteria.

The Examiner indicates (p. 4) that Ma discloses a system and method for retrieving objects based on indications of "relevance" and "irrelevance". The Examiner also acknowledges (p. 4) that Ma fails to teach, disclose, suggest or motivate generation of new query vectors based on relevance feedback. The Examiner suggests (p. 5) that motivation would flow from the teachings of Jain and the ability of Ma's system.

Ma teaches a system for indexing and retrieving database objects that are grouped into clusters and employs a correlation matrix 12 to track correlations between clusters of such objects (see, e.g., Abstract). Ma teaches updating of the correlation matrix and the clusters and does not teach, disclose, suggest or motivate modification of the query vectors or objects, or doing so in response to user feedback.

Applicant notes that Jain fails to suggest use of relevance feedback. Further, even if the teachings of the references were somehow combined, despite a lack of any teachings in the references of how to do so, the result clearly fails to provide the invention as recited in any of Applicant's claims 1, 11, 19, 32, 41 and 50 because the combination fails to provide, suggest or motivate generation of new query vectors based on relevance feedback or weighting feature elements based on relevance feedback, as recited, in varying language, in these claims.

Claim 11 recites a method of selecting between two types of matrixes to be used to weight a plurality of feature elements. Jain is silent with respect to selection between types of matrixes, as is the Office Action. In fact, Jain is void of the word "matrix" or any other word sharing a root with such and thus

cannot possibly teach or disclose such. As a result, it is inconceivable that Jain could suggest or motivate the invention as recited in claim 11.

Ma teaches a system for indexing and retrieving database objects that are grouped into clusters and employs a correlation matrix 12 to track correlations between clusters of such objects (see, e.g., Abstract). As such, Ma cannot possibly cure the deficiencies of Jain, and combining the teachings of Jain and Ma cannot provide the invention as recited in claim 11.

Claim 23 recites identifying a number of training samples, and, based on comparison of the number to a threshold, either transforming the query vector and the feature vector to a higher-level feature space or computing distances between the query vector and the feature vector. Claim 30 recites a system including a comparator configured to identify a number of training samples for which relevance feedback has been received, and which carries out analogous transformation and distance computations.

Jain uses the word "transform" exactly once, to describe a transformation from the data-rich representation of explicit image pixels to a compact, semantic-rich representation of visually salient characteristics (see Summary). Accordingly, Jain does not teach or disclose the invention as recited in claims 23 and 30 and cannot and does not suggest or motivate such.

Ma teaches transformation of feature vectors using modified radial basis functions (col. 6, line 23 et seq.). Ma is silent with respect to training samples, as is Jain. In fact, Jain and Ma are both void of the word "train" in any form. As a result, it is impossible to provide the invention as recited in claims 23 and 30 by combining the teachings of Jain and Ma.

Claim 10 recites specific aspects of an image included in the low level features. Specifically, claim 10 recites that "the low-level features include: a color moments feature, a wavelet based texture feature, and a water-fill edge feature", which is not taught, disclosed, suggested or motivated by Jain or Ma.

The Office Action states that such would be obvious. However, this is not the test for unpatentability (see *infra*).

In fact, both Jain and Ma are void of the terms "color moment", "wavelet" or "water-fill" and thus neither reference teaches or discloses such. As such, it is inconceivable that Jain or Ma, or any proper combination thereof, could render the invention as recited in claim 10 unpatentable. For at least these reasons, the rejection of claim 10 is improper and should be withdrawn, and claim 10 should be allowed.

Claims 7 and 46 recite specific aspects of generation of a query vector incorporating user feedback, while claims 8 and 48 recite specific aspects of generating weights for distances between a query vector and a feature vector by incorporating relevance. The Office Action repeatedly admits that Rui does not teach these aspects of Applicants' claimed invention (pp. 12-15), and states that the alternatives described in the reference "have the same effect" as the invention as recited in Applicants' claims. This is not a relevant test for a finding of unpatentability, as noted below. Accordingly, Applicant respectfully requests that the unpatentability rejection based on Jain, Ma and Rui be withdrawn.

Applicant notes the requirements of MPEP §2143, entitled "Basic Requirements of a Prima Facie Case of Obviousness" (see also MPEP

§706.02(j), entitled "Contents of a 35 U.S.C. 103 Rejection.") . MPEP §2143 states that "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings."

Inasmuch as the references fail to teach or disclose the elements recited in the claims, the references cannot provide motivation to modify their teachings to arrive at the invention as claimed, and the Examiner has identified no such teaching or disclosure in the references. As a result, the first prong of the test cannot be met.

MPEP §2143 further states that "Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations."

Inasmuch as the references fail to provide all of the features recited in Applicant's claims, the third prong of the test is not met. As a result, there cannot be a reasonable expectation of success. As such, the second prong of the test cannot be met.

MPEP §2143 additionally states that "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." This criterion cannot be met because the references fail to teach or disclose the elements recited in the claim. Accordingly, the unpatentability rejections based on Jain as modified in

view of Ma and on Jain, Ma and Rui fail all of the criteria for establishing a prima facie case of obviousness as set forth in the MPEP. For at least these reasons, Applicant respectfully requests that the §103 rejections be withdrawn, and that Applicant's claims 1-30, 32-38, 40-44 and 46-56 be allowed.

The cited references do not teach, disclose, suggest or motivate "One or more computer readable media including a computer program that is executable by a processor to cause the processor to perform acts of: receiving feedback regarding the relevance of each image of a set of images, the user feedback forming a range including at least Highly Relevant, Relevant, No Opinion, Irrelevant, and Highly Irrelevant; wherein N represents the number of images in the set of images for which user relevance feedback has been received, π_n represents the relevance of image n in the set of images, $\pi^{\rightarrow T}$ represents a transposition of a vector generated by concatenating the individual π_n values, and X represents an image matrix that is generated by stacking N training vectors corresponding to the set of images into a matrix; and generating a query vector (\vec{q}) corresponding to one of a plurality of features as follows:

$$\vec{q} = \frac{\pi^{\rightarrow T} X}{\sum_{n=1}^N \pi_n}, \text{ as recited in new claim 55. Therefore, Applicant believes}$$


that new claim 55 is allowable.

Conclusion

Claims 1-30, 32-38, 40-44 and 46-56 are in condition for allowance. Applicant respectfully requests reconsideration and issuance of the subject application. Should any matter in this case remain unresolved, the undersigned attorney respectfully requests a telephone conference with the Examiner to resolve any such outstanding matter.

Respectfully Submitted,

Date: Feb 26, 2003

By: 
Frederick M. Fliegel
Reg. No. 36,138
(509) 324-9256 x239

Version with Markings to Show Changes Made

In the Specification:

The paragraph on page 9 spanning lines 3-6 has been amended as shown below:

Computer 142 also includes a broadcast tuner 200. Broadcast tuner 200 receives broadcast signals either directly (e.g., analog or digital cable transmissions fed directly into tuner 200) or via a reception device (e.g., via an antenna [110] or satellite dish [114 of Fig. 1]).

In the Claims:

5. (Amended) One or more computer readable media as recited in claim 2, wherein X represents an image matrix that is generated by stacking N feature vectors, each of length K , corresponding to the set of potentially relevant images for which relevance feedback was received and resulting in an $(N \times K)$ matrix, C represents a weighted covariance matrix of X , $\det(C)$ represents the matrix determinant of C , and the matrix comprises a full matrix (W^*) that is generated as follows:

$$W^* = (\det(C))^{\frac{1}{K}} C^{-1}.$$

6. (Amended) One or more computer readable media as recited in claim 2, wherein w_{kk} represents the kk^{th} element of matrix W , x_k represents the k^{th} feature element, σ_k represents the standard deviation of the sequence of x_k 's, the matrix comprises a diagonal matrix with each diagonal element (w_{kk}) being generated as follows:

$$w_{kk} = \frac{1}{\sigma_k} ;$$

19. (Amended) One or more computer readable media having stored thereon a plurality of instructions that, when executed by one or more processors, causes the one or more processors to perform acts including:

comparing, for each of a plurality of images, a plurality of feature elements from a query vector to a plurality of feature elements from a feature vector corresponding to the image;

identifying a number of potentially relevant images based on the comparing;

receiving user feedback regarding [the] relevancy of one or more of the potentially relevant images;

re-comparing, for each of the plurality of images, the plurality of feature elements from the query vector to the plurality of feature elements from the feature vector, including using a matrix to compare the feature elements and dynamically selecting a type of matrix to use based on both the user feedback and the number of the plurality of feature elements;

identifying a new set of potentially relevant images based on the re-comparing; and

presenting the new set of potentially relevant images to the user.

27. (Amended) A method as recited in claim 23, further comprising:

repeating the generating, identifying of the feature vector, identifying of the number of training samples, and the determining for each of a plurality of features; and

identifying how closely the image and the [other] another image match each other by combining the distances between the query vectors and the feature vectors for the plurality of features.

28. (Amended) A method as recited in claim 27, wherein the identifying how closely the image and the another image match each other comprises calculating a weighted summation of each of the individual distances for each of the plurality of features.

Please cancel claim 31 without prejudice.

32. (Amended) [A method as recited in claim 31]

A method comprising:

for one of a plurality of images and each of a plurality of features,

generating, based on the set of search criteria, a query vector for the feature,

identifying a feature vector, corresponding to the image, for the feature, and

determining how closely the feature vector matches the query vector;
and

determining how closely the image matches the set of search criteria based on how closely, for the plurality of features, the feature vectors match the query vectors, wherein generating the query vector comprises generating the query vector based at least in part on user relevance feedback regarding how relevant images previously displayed to a user were.

33. (Amended) A method as recited in claim [31] 32, wherein identifying the feature vector comprises:

identifying a low-level feature vector corresponding to the feature;
and

mapping the low-level feature vector to a higher level feature space.

35. (Amended) A method as recited in claim [31] 32, wherein the initial search criteria comprises an image.

36. (Amended) A method as recited in claim [31] 32, wherein the determining how closely the feature vector matches the query vector comprises determining a distance between the feature vector and the query vector, and wherein the determining how closely the image matches the set of search criteria comprises calculating a weighted summation of each of the individual distances between the feature vectors and the query vectors.

37. A method as recited in claim 36, wherein the calculating a weighted summation comprises calculating the weighted summation based at least in part on user relevance feedback regarding how relevant images previously displayed to a user were.

38. (Amended) One or more computer readable media including a computer program that is executable by a processor to perform the method recited in claim [31] 32.

Please cancel claim 39 without prejudice.

40. (Amended) One or more computer readable media as recited in claim [39] 41, wherein the identifying the plurality of query vectors comprises extracting the plurality of query vectors from the image.

41. (Amended) [One or more computer readable media as recited in claim 39]

One or more computer readable media having stored thereon a plurality of instructions that, when executed by one or more processors, causes the one or more processors to perform acts including:

identifying a plurality of query vectors for one image, each query vector corresponding to one of a plurality of features;

identifying a plurality of feature vectors for another image, each feature vector corresponding to one of the plurality of features;

for each feature, determining a distance between the corresponding query vector and the corresponding feature vector; and

combining the distances to generate a value representing an overall distance between the one and the another image, wherein the identifying the plurality of query vectors comprises generating the plurality of query vectors based at least in part on user relevance feedback regarding how relevant images previously displayed to a user were.

42. (Amended) One or more computer readable media as recited in claim [39] 41, wherein the determining the distance between the corresponding query vector and the corresponding feature vector includes incorporating, into the determining, user relevance feedback regarding how relevant images previously displayed to a user were.

43. (Amended) One or more computer readable media as recited in claim [39] 41, wherein the combining the distances comprises calculating a weighted summation of each of the individual distances between the feature vectors and the query vectors.

Please cancel claim 45 without prejudice.

Claims 51-56 have been added.

END OF DOCUMENT